CLAIMS

We claim:

1. An antenna comprising:

a reflector having a reflector surface profile for reflecting a signal comprising a plurality of communication bands;

a multi-depth corrugated horn assembly for receiving the signal comprising the plurality of communication bands;

a stepped waveguide coupled to the corrugated horn;

a first polarizer coupled to the stepped waveguide for separating a first communication band from the plurality of communication bands;

a second polarizer coupled to the stepped waveguide for separating a second communication band from the plurality of communication bands; and

a third polarizer coupled to the stepped waveguide for separating a third communication band from the plurality of communication bands.

2. The antenna of claim 1 further comprising an input matching section coupled between the multi-depth corrugated horn and the stepped waveguide.

3. The antenna of claim 1 wherein the first polarizer comprises:

a plurality of 20 GHz slots coupled to the stepped waveguide;

a first plurality of band reject filters coupled to the plurality of 20 GHz slots;

a first plurality of magic T networks coupled to the first plurality of band reject filters;

a K-band short slot coupler coupled to the first plurality of magic T networks;

a 20 GHz LHCP port coupled to the K-band short slot coupler; and

a 20 GHz RHCP port coupled to the K-band short slot coupler.

4. The antenna of claim 3 wherein the second polarizer comprises:

a plurality of 30 GHz slots coupled to the stepped waveguide;

a second plurality of band reject filters coupled to the plurality of 30 GHz slots;

a second plurality of magic T networks coupled to the second plurality of band reject filters;

a Ka-band short slot coupler coupled to the second plurality of magic T networks;

a 30 GHz LHCP port coupled to the Ka-band short slot coupler; and

a 30 GHz RHCP port coupled to the Ka-band short slot coupler.

5. The antenna of claim 4 wherein the third polarizer comprises a septum polarizer having a 45 GHz LHCP port and a 45 GHZ RHCP port.

6. A method of transmitting data comprising:

reflecting a signal comprising a plurality of communication bands into a corrugated horn having dual depth corrugations; and

separating each of the plurality of communication bands with a multi-band polarizer;

wherein plurality of communication bands comprises a K-band signal, a Ka-band signal and a EHF-band signal.

7. The method of claim 6 further comprising directing the signal from the corrugated horn into a waveguide.

8. The method of claim 7 further comprising:

stopping propagation of the K-band signal in the waveguide with a first step junction; and

stopping propagation of the Ka-band signal in the waveguide with a second step junction.

9. A feed for an antenna system comprising:

a wideband corrugated horn comprising a plurality of dual depth corrugations;

a waveguide coupled to the wideband corrugated horn, the waveguide comprising a first step junction and a second step junction;

a first polarizer coupled to the waveguide in between the wideband corrugated horn and the first step junction;

a second polarizer coupled to the waveguide in between the first step junction and the second step junction; and

a third polarizer coupled to the waveguide after the second step junction.

10. The feed for an antenna system of claim 9 wherein the first step junction stops the propagation of a K-band signal and wherein the second step junction stops the propagation of a 30 GHz signal Ka-band signal.

11. The feed for an antenna system of claim 10 wherein the third polarizer receives an EHF-band signal.

12. The feed for an antenna system of claim 9 further comprising an input matching section coupled between the wideband corrugated horn and the waveguide.

13. The feed for an antenna system of claim 9 wherein the first polarizer comprises:

a plurality of 20 GHz slots coupled to the stepped waveguide;

a first plurality of band reject filters coupled to the plurality of 20 GHz slots;

a first plurality of magic T networks coupled to the first plurality of band reject filters;

a K-band short slot coupler coupled to the first plurality of magic T networks;

a 20 GHz LHCP port coupled to the K-band short slot coupler; and

a 20 GHz RHCP port coupled to the K-band short slot coupler.

14. The feed for an antenna system of claim 9 wherein the second polarizer comprises:

a plurality of 30 GHz slots coupled to the stepped waveguide;

a second plurality of band reject filters coupled to the plurality of 30 GHz slots;

a second plurality of magic T networks coupled to the second plurality of band reject filters;

a Ka-band short slot coupler coupled to the second plurality of magic T networks;

a 30 GHz LHCP port coupled to the Ka-band short slot coupler; and

a 30 GHz RHCP port coupled to the Ka-band short slot coupler.

15. The feed for an antenna system of claim 9 wherein the third polarizer comprises a septum polarizer having a 45 GHz LHCP port and a 45 GHZ RHCP port.

16. A apparatus for use in a communication system comprising:

means for reflecting a set of beams from an antenna into an antenna feed, the beam comprising a K-band signal, a Ka-band signal, and an EHF-band signal;

means for separating the K-band signal from the set of beams;

means for separating the Ka-band signal from the set of beams; and

means for separating the EHF-band signal from the set of beams.

17. The apparatus of claim 16 further comprising:

means for separating the K-band signal into a K-band LHCP signal and a K-band RHCP signal;

means for separating the Ka-band signal into a Ka-band LHCP signal and a Ka-band RHCP signal; and

means for separating the EHF-band signal into a EHF-band LHCP signal and a EHF-band RHCP signal.

18. The apparatus of claim 17 further comprising:

means for reflecting a X-band signal, wherein the set of beams further comprises the X-band signal; and

means for separating the X-band signal from the set of beams.

19. The apparatus of claim 18 further comprising means for forming an X-band single circular beam.

20. The apparatus of claim 17 further comprising:

means for reflecting a C-band signal, wherein the set of beams further comprises the C-band signal; and

means for separating the C-band signal from the set of beams.

21. The apparatus of claim 20 further comprising means for forming a C-band single circular beam.

22. The apparatus of claim 20 further comprising:

means for reflecting a X-band signal, wherein the set of beams further comprises the X-band signal; and

means for separating the X-band signal from the set of beams.

23. The apparatus of claim 22 further comprising means for forming an X-band single circular beam.